

# **Uranium and Radium in Drinking Water**

Uranium and radium levels in drinking water exceed health standards in 28 Colorado communities. These radioactive metals occur naturally in Colorado's mineral-rich rock, and can dissolve into groundwater wells used for drinking water supplies. Our Winnable Battle to reduce uranium and radium in public drinking water supplies will decrease the number of people exposed to drinking water containing these harmful contaminants.

# Why is this important?

Long-term exposure to uranium and radium in drinking water can lead to cancer. Long-term exposure to uranium in drinking water may also cause toxic effects to the kidneys. Radium and uranium found in drinking water do not emit high amounts of gamma radiation, so bathing and showering do not pose a significant risk. In Colorado, the number of people who have access to drinking water that exceeds the standards for these radioactive metals makes this the largest, most wide-spread chronic health risk from drinking water.

#### Where are we?

Public water systems are required to sample and analyze their water for uranium and radium. The U.S. Environmental Protection Agency has set drinking water standards for drinking water that contains these metals. In 2010, 28 public drinking water systems, serving 21,204 residents in the state, had drinking water above the drinking water standards for uranium or radium. The Water Quality Control Division at the Colorado Department of Public Health and Environment is making progress with focused outreach and assistance to these small communities. Most of the solutions that will reduce the health risk are costly and complex to implement.

#### Where do we want to be?

Ultimately, the goal is that all Colorado's residents and visitors served by public drinking water systems will have drinking water that meets all health-based standards. The interim target for 2016 is to reduce the number of public water systems exceeding uranium or radium standards to 16 systems serving 4,116 people. Between now and 2016, the goal is to work with affected public drinking water systems to install drinking water treatment processes or identify alternate drinking water sources.

## What is being done?

Owners of public drinking water systems with uranium and radium problems are working with department subject matter experts to select an approach for water treatment to remove these metals, or to establish an alternate source of water. The department provides technical and financial assistance to the communities with elevated uranium and radium levels in their drinking water supplies so that they can develop new water sources or install treatment.

Several treatment processes can remove radium and uranium from drinking water, including ion exchange, reverse osmosis, nanofiltration and co-precipitation. These technologies can be complicated and costly for small drinking water systems to operate and to maintain. The selection of a given treatment is based on the type and level of contaminants present, the volume of water to be treated and the cost of the treatment.

Each of the systems with drinking water that exceeds the standards has been issued an enforcement order, a legal document requiring the system to comply with the regulations and follow a set schedule for submittals and implementation of treatment. These public drinking water systems are required to provide public notice about the quality of their water to all their customers.

Due to the natural geology of the region, the lower Arkansas River Valley has a high number of public drinking water systems whose groundwater wells are high in naturally occurring radium and uranium. Several water systems in this region have no available cost-effective options. In support of the long-term solution needed for these communities, the department continues to coordinate with local and federal agencies to support the Arkansas Valley Conduit that will bring fresh, clean water to this area of the state.

## **High-risk groups**

The primary effect of long-term exposure to uranium or radium is cancer. Cancer occurs in the general population regardless of exposure to radiation or toxic chemicals. Drinking water standards are set to reduce additional exposure. Many years of exposure to radiation and toxic chemicals can lead to increased adverse health effects, such as kidney toxicity and cancer.

Uranium and radium found in drinking water in Colorado do not represent an acute or immediate health risk. People who have been drinking water containing these metals over many years, people with liver or urinary tract conditions and people who have been exposed to radiation through sources other than drinking water are at the greatest risk for developing health problems from long-term exposure to uranium or radium in their drinking water.

# **Underlying causes**

Uranium and radium in drinking water occur naturally in some areas of Colorado. Treatment solutions and alternate sources of drinking water exist, but often are costly and complex, and may take a long time to implement. Even if water is treated for uranium and radium, appropriately disposing of radioactive materials that remain after treatment also is difficult and expensive. At this time, the people in Colorado who are exposed to uranium and radium in drinking water live mostly in small, rural and economically disadvantaged communities that lack the technical, managerial and financial capacity to rapidly correct the problem.